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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/735,844	12/16/2003	Hiroaki Takehara	032190	3178
38834	7590	08/08/2006	EXAMINER	
WESTERMAN, HATTORI, DANIELS & ADRIAN, LLP 1250 CONNECTICUT AVENUE, NW SUITE 700 WASHINGTON, DC 20036			RAETZSCH, ALVIN T	
			ART UNIT	PAPER NUMBER
			1754	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/735,844	Applicant(s) TAKEHARA ET AL.	
	Examiner Alvin T. Raetzsch	Art Unit 1754	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 19 May 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-10 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-10 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 16 December 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date <u>3/9/04; 5/19/05; 3/24/05</u> | 6) <input type="checkbox"/> Other: _____ |

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

1. **Claim 2** is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The phrase "...a range of more than 300 to 600..." is not clear. Is the value in the range of 600-900 or is it more than 600?

Double Patenting

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

2. **Claims 1, 3, & 6-7** are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1 & 6-7 of copending Application No. 10/735824 in view of US Patent 5,273,729 or in view of applicant's admissions. Application '824 claims incomplete combustion to form fullerenes and collecting soot in a heat resistant filter by controlling the temperature of the gas. Although many of the fullerenes are allowed to pass first filter, a portion are

captured in the soot. Application '824 does not claim treating the soot to collect the fullerenes within. 5,273,729 and the applicant's background teach that it is old and known to use solvents to extract fullerenes from soot. It would have been obvious to one of skill in the art to treat the soot collected in the first filter of '824 in order to maximize overall fullerene yield.

This is a provisional obviousness-type double patenting rejection.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. **Claims 1-2 & 4** are rejected under 35 U.S.C. 102(e) as being anticipated by Kronholm et al. (2004/0057896).

Kronholm teaches imperfectly combusting a hydrocarbon to make fullerenes followed filtering of a mixture of soot and fullerenes using a ceramic filter [0065] from the high temperature exhaust gas at a controlled temperature of 400-450°C (Example 5, which collects soot and fullerenes in filter element 230 in the process figures). Kronholm also teaches using sublimation to collect fullerenes from the soot-fullerene mixture (paragraphs [0025], [0089], & claim 117).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. **Claims 1, 3, & 5-7** are rejected under 35 U.S.C. 103(a) as being unpatentable over Yoshikawa et al. (12/5/03) in view of Howard et al. (5,273,729).

Yoshikawa et al. teach imperfect combustion of a hydrocarbon followed by passing the high temperature gas through a sintered metal filter to collect soot and fullerenes produced. Collecting the fullerenes from the soot is not taught. Howard teaches using solvent extraction to collect fullerenes from a soot mixture. It would have been obvious to one of ordinary skill in the art at the time of the invention to collect the fullerenes using solvent extraction from the soot mixture of Yoshikawa in order to collect and use the product in pure form.

Yoshikawa does not state a filtration flow capacity for the filter used. The filtration flow capacity is a result effective variable that is based filter properties and is optimized to control filtration efficiency and caking of the filter. It would have been obvious to one of ordinary skill in the art of filtration at the time of the invention to optimize the filtration flow capacity in order to maximize efficiency and reduce caking.

Yoshikawa does not state a reactor configuration. It would have been obvious to use a vertical reactor with the burner at the top or at the bottom and the corresponding exhaust outlet at the bottom or at the top as a matter of structural necessity of preference, such as feed/exit piping location. It also would have been obvious as a matter of design choice.

5. **Claims 1, 3, & 5-10** are rejected under 35 U.S.C. 103(a) as being unpatentable over Alford et al. (2003/0041732).

Alford teaches a process for making fullerenes by imperfect combustion of hydrocarbons followed by filtering of the soot and fullerenes in a heat-resistant filter. Ceramic materials as the filtering element are taught [0037]. Alford also teaches that it is known in the art to extract fullerenes from soot using solvents [0004].

Alford teaches using cylindrical (see Element 2 in Figures 1-2) filtering elements, each having a bottom, wherein the gas flows from the outside to the inside ([0038] & Figure 1) and teaches the use of multiple filter elements in one filtering apparatus

[0043]. Alford also teaches unclogging the filters by injecting an inert gas from the inside of the filters to the outside, thereby knocking the mixture from the filter. Although Alford does not explicitly teach “plural gangs”, it does teach cleaning multiple elements with one or more gas injectors and cleaning the filters simultaneously or sequentially [0043]. It would have been obvious to one of ordinary skill in the art of filtration at the time of the invention to use separate injectors for groups of filter elements in view of these teachings in order to increase surface area and/or capacity.

Alford does not state a filtration flow capacity for the filter used. The filtration flow capacity is a result effective variable that is based filter properties and is optimized to control filtration efficiency and caking of the filter. It would have been obvious to one of ordinary skill in the art of filtration at the time of the invention to optimize the filtration flow capacity in order to maximize efficiency and reduce caking. The process parameters and materials used by Alford correspond to those of the applicant and a flow capacity in the claimed range is expected.

It also would have been obvious to use a vertical reactor with the burner at the top or at the bottom and the corresponding exhaust outlet at the bottom or at the top as a matter of structural necessity of preference, such as feed/exit piping location. It also would have been obvious as a matter of design choice.

6. **Claims 2 & 4** are rejected under 35 U.S.C. 103(a) as being unpatentable over Alford et al. (2003/0041732) as applied to claim 1 above, and further in view of Kronholm et al. (2004/0057896).

Alford teaches using a temperature control device after combustion and before filtering (Figure 2, coils before filtering unit), but does not teach specific temperatures for collecting the mixture of soot and fullerenes or purification using sublimation.

Kronholm teaches combusting a hydrocarbon to make fullerenes followed filtering the soot from the high temperature gas at 400-1000°C (paragraph [0065]) without collecting PAH. Kronholm extensively teaches acceptable temperatures for successfully filtering different particles including soot, fullerenes of different molecular

weights, and PAH. It is taught that fullerenes and soot will be filtered when the filter inlet is controlled at about 450°C, and that C₆₀ fullerenes can be subsequently filtered at a temperature below 400°C. In view of these teachings it would have been obvious to one of ordinary skill in the art at the time of the invention to control the filter temperature of Alford at 300-400°C to collect all of the fullerenes and soot, as this is the goal of Alford.

Kronholm also teaches that the use of sublimation is known in processes where the fullerenes are in a mixture with the soot. It would have been obvious to one of ordinary skill in the art to use sublimation to collect the fullerenes from the soot mixture in the process of Alford as an alternative to solvent extraction.

7. **Claim 3** is rejected under 35 U.S.C. 103(a) as being unpatentable over Alford et al. (2003/0041732) as applied to claim 1 above, and further in view of Howard et al. (5,273,729).

Alford teaches that it is known in the art to extract fullerenes from soot using solvents. Howard teaches using solvent extraction to collect fullerenes from a soot mixture. It would have been obvious to one of ordinary skill in the art at the time of the invention to collect the fullerenes using solvent extraction from the soot mixture of Yoshikawa in order to collect and use the product in pure form.

8. **Claim 4** is rejected under 35 U.S.C. 103(a) as being unpatentable over Alford et al. (2003/0041732) as applied to claim 1 above, and further in view of Mueller et al. (5,458,742).

Alford teaches that it is known in the art to extract fullerenes from soot using solvents, but does not teach using sublimation to extract fullerenes. Mueller teaches using sublimation to collect fullerenes from a mixture with the soot. It would have been obvious to one of ordinary skill in the art to use sublimation to collect the fullerenes from the soot mixture in the process of Alford as an alternative to solvent extraction.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alvin T. Raetzsch at 571-272-8164, normally 9-5 M-F.

ATR



STUART L. HENDRICKSON
PRIMARY EXAMINER